

CLAIMS

1. A lighting method of a high pressure discharge lamp, characterized in that in a transition state of making transition from a lighted state to light off, a lamp current to be supplied to electrodes is reduced to an extent an arc discharge is not extinguished so that a lamp temperature reaches an equilibrium temperature and the current supply to the electrodes is cut at the point the lamp temperature reaches the equilibrium temperature.

2. A lighting method of a high pressure discharge lamp used as a light source of an image equipment, characterized in that in a transition state of making transition from a lighted state to light off, a state in which an image does not appear on a screen is obtained by switching OFF the image equipment, and the power to be supplied to the high pressure discharge lamp is reduced to an extent an arc discharge is not extinguished and maintained until a lamp temperature reaches an equilibrium

temperature, and the current supply to the electrode is cut at a point the lamp temperature reaches the equilibrium temperature.

3. The lighting method of the high pressure discharge lamp according to any one of claims 1 to 3, wherein the reducing amount of the lamp power is $1/2$ to $1/20$ of a rated power.

4. The lighting method of the high pressure discharge lamp according to claim 1 or 2, wherein the reduction time of the reduced lamp power is greater than or equal to 60 seconds.

5. A lighting method of a high pressure discharge lamp, characterized in that in a transition state of making transition from a lighted state to light off, a lamp power to be supplied to electrodes is reduced to an extent an arc discharge is not extinguished and the arc discharge is maintained for a while (period (t_2)) and thereafter made transition to a glow

discharge and maintained for a while (period (t3)), and the current supply to the electrodes is cut.

6. A lighting method of a high pressure discharge lamp, characterized in that in a transition state of making transition from a lighted state to light off, a state in which an image does not appear on a screen is obtained by switching OFF an image equipment, and a power to be supplied to electrodes is reduced to an extent an arc discharge is not extinguished and maintained for a while (period (t2)) and thereafter made transition to a glow discharge and maintained for a while (period (t3)), and the current supply to the electrodes is cut.

7. The lighting method of the high pressure discharge lamp according to claim 5 or 6, wherein the reducing amount of the lamp power is $1/2$ to $1/20$ of a rated output, and the power after reduction is constant, or reduced in a step wise manner with time, or reduced continuously with time.

8. The lighting method of the high pressure discharge lamp according to any one of claims 5 to 7, wherein the reduction time (t_2) of the reduced lamp power is 20 to 240 seconds.

9. The lighting method of the high pressure discharge lamp according to any one of claims 5 to 8, wherein the glow discharge maintaining time (t_3) is 10 to 120 seconds.

10. A lighting device of a high pressure discharge lamp being characterized by comprising:

(a) a lighting starter circuit for starter lighting by applying a high voltage pulse or a low voltage direct current voltage to the high pressure discharge lamp;

(b) a stable lighting circuit, connected to the lighting starter circuit, for stably lighting the high pressure discharge lamp;

- (c) a power controller for controlling the power supply from the stable lighting circuit to the high pressure discharge lamp;
- (d) a lamp power reducing control circuit for having the power controller control the stable lighting circuit so that a stable supply of the lighting power from the stable lighting circuit to the high pressure discharge lamp is performed in stable lighting, and control the stable lighting circuit so as to narrow the lamp power to be supplied to the high pressure discharge lamp to a lamp power of an extent an arc discharge between electrodes is not extinguished in a transition state when the high pressure discharge lamp makes transition from the stable lighting to light off after switching OFF the image equipment,; and
- (e) an optical engine control circuit for outputting an image OFF signal to an optical engine for sending images to a screen so as to have the screen in a state in which the image does not appear at the same time as the switch OFF.

11. A lighting device of a high pressure discharge lamp being characterized by comprising:
- (a) a lighting starter circuit, connected to the high pressure discharge lamp, for starter lighting by applying a high voltage pulse starting voltage or a direct current starting voltage to the high pressure discharge lamp;
 - (b) a stable lighting circuit, connected to the lighting starter circuit, for stably lighting the high pressure discharge lamp;
 - (c) a power controller, connected to the stable lighting circuit, for controlling the power supply from the stable lighting circuit to the high pressure discharge lamp;
 - (d) a lamp power reducing control circuit, connected to the power controller, for having the power controller control the stable lighting circuit so that a stable supply of the lighting power from the stable lighting circuit to the high pressure discharge lamp is performed in stable lighting, and control the stable lighting circuit so as to lower the lamp power to be

supplied to the high pressure discharge lamp to a lamp power of an extent an arc discharge between electrodes is not extinguished in a first half of a transition state of when the high pressure discharge lamp makes transition from the stable lighting to light off;

(e) a glow discharge maintaining circuit, connected to the high pressure discharge lamp, for making transition the high pressure discharge lamp to glow discharge in a second half of the transition state and maintaining the glow discharge after transition; and

(f) a glow discharge control circuit, connected to the glow discharge maintaining circuit, for maintaining the glow discharge and cutting the current supply to the electrodes after maintaining the glow discharge.

12. The lighting device of the high pressure discharge lamp according to claim 10, wherein the high voltage pulse starting voltage is 10kV to 15kV.

13. The lighting device of the high pressure discharge lamp according to claim 6, characterized in that the direct current starting voltage is 1kV to 4kV.

14. An image equipment being characterized by comprising:

- (a) a screen for showing an image;
- (b) an optical engine for projecting the image on the screen;
- (b) a high pressure discharge lamp for supplying light to the optical engine;
- (c) a lighting starter circuit for applying the starter lighting voltage to the high pressure discharge lamp and a stable lighting circuit for supplying a stable lighting power to the high pressure discharge lamp in stable lighting;
- (d) an optical engine control circuit for controlling the optical engine with switching OFF of the image equipment to have the screen in a state in which an image does not appear; and

(e) a lamp power reducing control circuit for turning OFF the high pressure discharge lamp at a point the high pressure discharge lamp has reached an equilibrium temperature due to cooling after the switch OFF or after an elapse of a suitable time in which the high pressure discharge lamp is assumed to have reached the equilibrium temperature.

15. An image equipment being characterized by comprising:

- (a) a screen arranged in the image equipment for showing an image;
- (b) an optical engine for projecting the image on the screen;
- (c) a high pressure discharge lamp for supplying light to the optical engine;
- (d) a lighting starter circuit, connected to the high pressure discharge lamp, for applying the starter lighting voltage to the high pressure discharge lamp;
- (e) a stable lighting circuit, connected to the lighting starter

circuit, for supplying a stable lighting power to the high pressure discharge lamp in stable lighting of the high pressure discharge lamp;

(f) a power controller, connected to the stable lighting circuit, for controlling the power supply from the stable lighting circuit to the high pressure discharge lamp;

(g) an optical engine control circuit, connected to an optical engine, for controlling the optical engine by switching OFF of the image equipment to have the screen in a state in which an image does not appear;

(h) a lamp power reducing circuit, connected to the power controller, for reducing the lamp power to an extent an arc discharge is not extinguished by cooling the lamp after the switch OFF and maintaining the arc discharge for a while(period (t_2));

(i) a glow discharge maintaining circuit, connected to the high pressure discharge lamp, for making transition from the arc discharge by the reduced power to the glow discharge and maintaining the glow discharge;
and

(j) a glow discharge control circuit, connected to the glow discharge maintaining circuit, for controlling the glow discharge maintaining circuit and cutting the current supply to the electrodes after maintaining the glow discharge for a while (period (t3)).